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5.4.4 Lighting Controls

Lighting controls enable building occupants or building managers to modify illumination levels to meet task and comfort requirements while minimizing unneeded or wasted lighting energy use. A well-designed lighting control system has the potential to reduce lighting energy use by 30–50%. Electric lighting can be controlled by giving occupants manual control over their personal lighting, by automatically controlling light levels based on occupancy or daylight levels, or by a combination of these strategies. Occupancy sensors can turn off lighting when no one is in the area. Daylight controls are better handled with dimmers than with on/off switches.

Opportunities

Buildings where banks of electric lights are on all day, irrespective of the amount of natural daylight and occupancy, are excellent candidates for retrofitting with more sophisticated lighting controls. Rooms with window walls but no ability to control banks of luminaires along the windows are also good candidates for better controls. Whenever a building is being renovated or remodeled to the extent that the lighting is being reconfigured in any way (see *Section 5.4 – Lighting*), be sure to consider lighting controls as well. These can be combined with daylight dimming controls that set an upper lighting limit and with occupancy sensors that turn off the lights when no one is in the area. Use automatic daylight dimming or on/off controls for common and public areas. Use occupancy sensors in all areas of the building for maximum energy savings.

Technical Information

Many types of controls not only give occupants control over their space but also respond to daylighting and occupancy through dimming and on/off controls. The key to a successful lighting control project is selecting the correct system to give occupants "control" over their lighting, as opposed to a system that takes away that control. Inappropriate lighting controls may be overridden, which results in loss of all potential energy savings.

MANUAL DIMMING

Manual dimming is ideal for individual offices, conference rooms, and classrooms. Lighting levels can be dimmed by the occupants according to the tasks and appearance of an area. Psychologically, manual dimming is the most successful type of control because occupants can vary their own lighting levels. Fluorescent dimming ballasts can lower the lighting power to as little as 1–10%, depending on the ballast type. Every time the lights are dimmed, energy is saved.

DAYLIGHT CONTROLS

Automated daylight dimming is an important lighting control strategy in spaces where there is a significant amount of natural light but where turning electric lights off altogether would be inappropriate. Thus, it is a useful strategy in perimeter areas of large open offices, lobby areas, and employee lounges. Dimming electronic ballasts reduce or increase the light output gradually as natural light level changes, almost imperceptibly. Where daylight is adequate and the light source is not easy to see from normal viewing angles, lighting can be turned off with a photosensor control.

OCCUPANCY SENSORS

Occupancy sensors (infrared, ultrasonic, and combination) provide an ideal way of turning lights off when no one is in the area. In order to avoid nuisance on/off

High-quality occupancy sensors and other types of lighting controls like these are now readily available from a number of manufacturers. Photo: The Watt Stopper

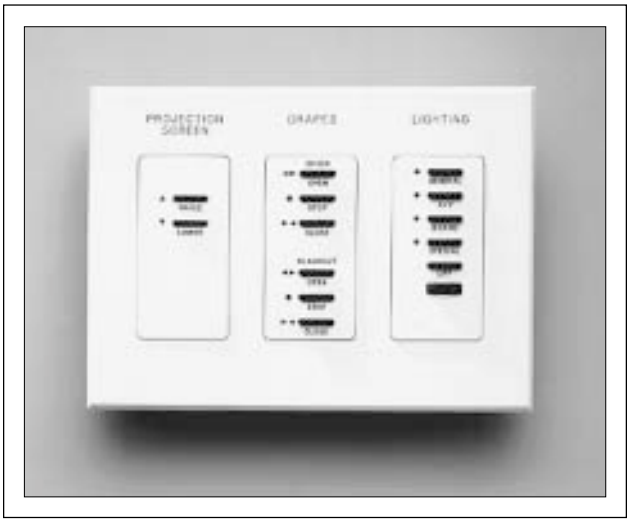

Photo: Lutron Electronics Co., Inc.

Customized controls like these are available for controlling not only lighting but also drapes, projector screens, and other electrically operated devices.

trippings, make sure that the occupancy sensor is specified for the type of area and its use. Consult with occupancy sensor control manufacturers to ensure the correct number, type, and mounting of occupancy sensors so they will provide proper coverage and optimal control. Specifics on the various types of occupancy sensors are as follows:

Infrared occupancy sensors are ideal for small enclosed rooms, such as private offices, conference rooms, small supply rooms, classrooms, and other spaces where the sensor has a "line of sight" view to occupants. Infrared sensors pick up small amounts of movement and are reliable in these small, unpartitioned situations. Wall-mounted infrared sensors are the most common.

Ultrasonic occupancy sensors are ideal for large open spaces and areas where partitions are present, such as open offices, large conference rooms, lecture halls, hallways, large lunchrooms, and lobbies. Ceiling-mounted ultrasonic sensors are the most common.

Combination infrared and ultrasonic sensors provide the most reliable system because use of both detection mechanisms overcomes the weaknesses of each.

MANUAL DIMMING/INFRARED COMBINATION

The combination of manual dimming with occupancy sensors is another good option for small offices and conference rooms. One wall-mounted control can provide manual dimming for the occupant and still turn lights off when everyone leaves the room.

POST-OCCUPANCY EVALUATION (FINE-TUNING CONTROLS)

It is important for users to understand how to use dimming and occupancy controls. Correctly setting sensitivities and time delays prevents nuisance on/off trippings. In addition, longer time delays are appropriate for areas that should remain lighted all day long, such as main hallways and busy restrooms, but where lighting should be turned off at the end of the day. Lights can turn on for cleaning crews and employees working in off-hour periods. Both occupancy sensors and daylight sensors need to be adjusted to provide the desired lighting levels.

Contacts

National Dimming Initiative, (847) 390-5136. Industry initiative led by Advance Transformer.

Complete information on the ENERGY STAR® program, including the Green Lights Program, is available by calling the ENERGY STAR Hotline: (888) STAR-YES; www.epa.gov/energystar or www.energystar.gov.

The National Lighting Product Information Program (NLPIP) of the Lighting Research Center at Rensselaer Polytechnic Institute offers independently evaluated product information, including manufacturer-specific test results on thousands of lamps, fixtures, ballasts, and controls; www.lrc.rpi.edu.